

# Plexus Anaesthesia

Reliability and success with  
Stimuplex®, Contiplex® and Alphaplex®



The leading edge in  
Plexus Anaesthesia Equipment.



**B | BRAUN**

# Plexus Anaesthesia

## Introduction to Brachial Plexus Block

by Dag E. Selander, MD, PhD, Gothenburg, Sweden

Blockade of the brachial plexus with local anaesthetics can provide anaesthesia of the upper extremity, from the shoulder to the fingertips. Correctly performed, plexus block offers excellent regional anaesthesia and muscle relaxation for surgery and a method for long-term postoperative analgesia, both with minimal interference with the patient's vital functions. The extent and duration of the block can be tailored to meet the needs required by the type of surgery and the patient's condition, by selecting 1. the site of injection, 2. the local anaesthetic (LA), and, 3. the use of either a single shot or a continuous technique.

In principal the same applies to plexus anaesthesia of the lower limbs.

Besides skill and experience adequate injection equipment and local anaesthetics form the basis for an atraumatic and successful plexus blockade.

### 1. Site of injection

The neurovascular sheath which surrounds the brachial plexus and concomitant major blood vessels from the neck to the mid upper arm, allows blockade by a single injection into the sheath at three principal levels: supraclavicular (interscalene and subclavian perivascular), infraclavicular or axillary. There are several methods of identifying the brachial plexus e.g. eliciting a paraesthesia with the needle point, using a nerve stimulator or recognising the "click" as the needle enters the sheath. With practice, success rate will improve!

### 2. Choice of LA

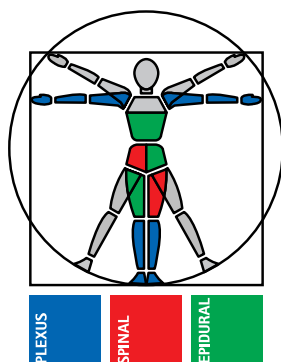
The duration of surgery decides choice of LA. Short acting LAs are lido-, mepiva- and prilocaine with durations from 1.5–3 h, adrenaline 5 µg/ml prolongs duration with some 50%. The long acting bupivacaine and ropivacaine may last from 5–10 h or more. It is important to inject a sufficient volume of the LA for a reliable block. For supra- and infraclavicular techniques 20–40 ml are needed, for axillary blocks 40–50 ml.

### 3. Continuous technique

Using a continuous technique, surgical anaesthesia can be prolonged as needed, by intermittent bolus or continuous infusion of the LA. Regional postoperative analgesia can be extended for several days by similar administration of a low concentrated long acting LA, which will minimize motor blockade. With this technique, effective pain relief can be achieved without the side effects of opioids or other centrally acting analgesics. As sympathetic blockade will accompany sensory blockade, the limb will remain vasodilated, which is highly advantageous after replantation operations.

For reliable and safe plexus blocks, the patient should be adequately monitored and only lightly sedated. The anaesthetist should be familiar with signs and symptoms of overdosage, and prepared to treat such situations. To avoid neural complications, peripheral nerves should be handled with care, i.e. use recommended LAs and short bevel needles, and try to avoid rough paraesthesiae.

## The Art of Regional Anaesthesia



Developed and manufactured in strict accordance with the requirements of clinical practice:

### The B. Braun Range:

#### ■ Stimuplex®

Systems for "single-shot" technique with nerve stimulation: Stimuplex® HNS 11 nerve stimulator and Stimuplex® D needles, Stimuplex® Dig RC and Stimuplex® A needles

#### ■ Contiplex® and Alphaplex®

Sets for continuous blockade with and without nerve stimulation

New: Contiplex® D 110 mm set with newly designed catheter

# Peripheral Electrical Nerve Stimulation (PENS)

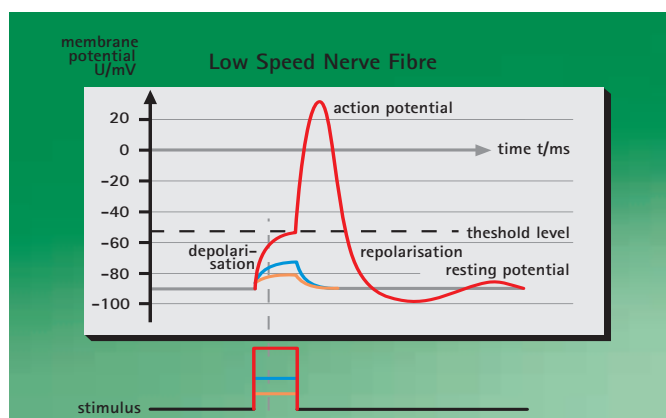
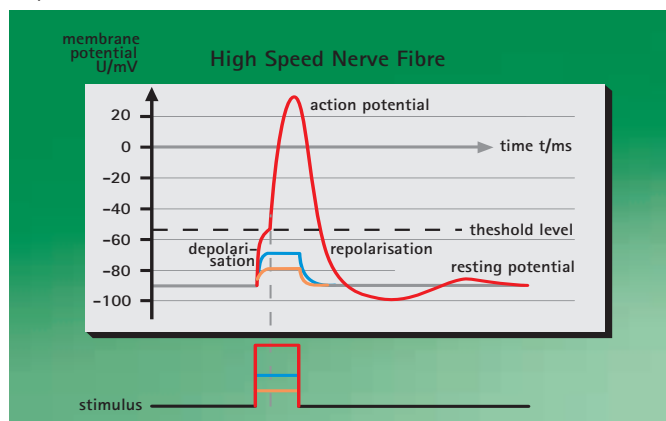
## Principles

By simplifying the accurate location of peripheral nerves, peripheral electrical nerve stimulation (PENS) facilitates the performance of nerve and plexus blocks increasing their safety and reliability. The old rule "no paraesthesia - no anaesthesia" loses its validity, because information from the patient concerning paraesthesia is eliminated, and the danger of a mechanical nerve lesion is largely excluded. The principle consists of triggering depolarizations with electrical pulses at, but not within, the nerve, causing muscular contractions at the effector muscle or sensitive sensations in the distribution area. Paraesthesia due to direct contact of injection needles and nerve is consciously avoided. PNS does not replace the anatomical knowledge required for regional anaesthesia, rather it assumes accurate knowledge of the topography and the nerve distribution area.

The various types of nerve fibre differ in regard to their sensitivity to electrical stimulation. The A-alpha motor fibres have the shortest chronaxia (50 - 100  $\mu$ s). The fibres of pain sensation (A-delta and C-fibres) require a longer pulse (150 and 400  $\mu$ s respectively) at minimum current. Mixed peripheral nerves can be localized with short pulses (0.1 ms) without triggering pain sensations. For pure sensory nerves, a longer pulse (0.3 or 1.0 ms) is recommended.

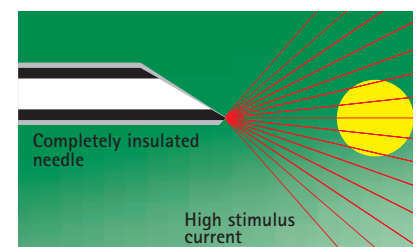
## Basic of Electrical Nerve Stimulation

Depolarisation, Threshold Level, Action Potential

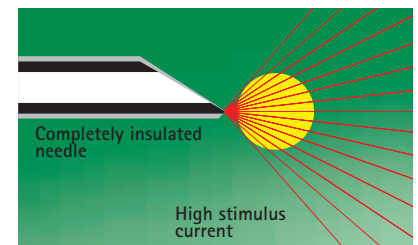


When using unipolar needles (needles with an insulated needle shaft and a conductive tip), the current necessary to trigger muscular contractions (= pulse amplitude) correlates with the distance of the tip of the needle from the nerve: the lower the threshold current the more accurately is the nerve localized, and the shorter the onset and more reliable the success of the block.

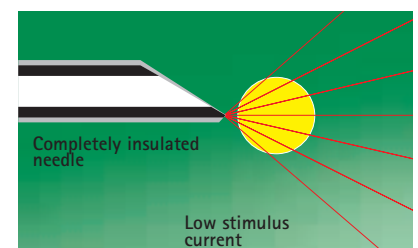
Needle tip more distant from the nerve



Needle tip closer to the nerve



Needle tip closer to the nerve



The shorter the electrical pulse (= pulse width), the faster is the rise in current to the nerve, and the clearer the discrimination as to whether the needle tip is sufficiently close to the nerve. The stimulation needle should always be connected to the negative pole because higher currents are required if the polarity is reversed (needle positive).

The geometry of the electrical current field is dependent on the geometry of the conductive tip of the stimulation needle. The smaller the emission site of the electrons at the tip of the needle, the higher is the current density at this point and the lower the threshold current when the nerve is exactly localized. The B. Braun stimulators (Stimuplex® HNS 11 and the new Stimuplex® Dig RC) have been designed according to the most modern aspects and the requirements which originate from the theory and practice of peripheral electrical nerve stimulation. They are provided with alarm systems necessary for the early detection of technical faults which could endanger the patient and place the success of the anaesthesia in jeopardy.



# NEW Stimuplex® Dig RC / Stimuplex® A needles

System for "single-shot" technique with nerve stimulation.

This Stimuplex® system is composed of the updated nerve stimulator Stimuplex® Dig RC with the option of nerve stimulation via Remote Control (RC) and a range of corresponding Stimuplex® needles with atraumatic short bevelled tips.

The Stimuplex® system allows a very smooth and target-directed procedure to position the needle tip close to the nerve.

In addition it is well tolerated by the patient because it is not necessary to elicit paraesthesia.

Stimuplex® with its high level of safety by continuous feed back represents the ideal system for training in plexus blockade as well as for daily clinical routine.

## Stimuplex® DIG nerve stimulator

Only one knob for operation:

- current setting and measuring at the same time without using an additional switch
- yellow LED indicates every current pulse
- flashing display if current flow is less than set current

Impulse width 0.1 ms:

- reliable stimulation of motor fibres without stimulation of afferent fibres (pain)

Selectable impulse frequency

- for most convenient and reliable stimulation

NEW: Integrated electrode cable

- more stable and integrated cable for better protection against damage
- avoids inadvertent mix-ups with other cables (e.g. HNS 11) or its loss

NEW: Extended acoustic control of the stimulus

- optimum security during the entire performance



## Remote control for sterile one-hand-operation

Simultaneous puncture and stimulation:

- no coordination problems with assistance staff
- more attention to the patient

Safe placement in the anaesthetist's palm:

- easy fixation with two finger rings
- sterile handling due to a glove to be put on the usual way

Operation by two small "Up"- and "Down"-buttons only

- tactile feeling combined with acoustic control

The new Remote Control RC is offered separately and available under code-no. 489 2216 B.

### Technical Data Remote Control:

Fixing:	Via finger rings on the palm
Sterility:	To be placed under the sterile glove
Adjustment:	Set required current value by pressing the buttons "Up" or "Down"
Connection:	Via steering-cable to the tripolar output socket on the front panel of the Stimuplex® Dig RC
Case (Housing):	Plastic
Dimensions:	11.4 x 7.2 x 3.3 cm

### Technical Data Stimuplex® Dig RC:

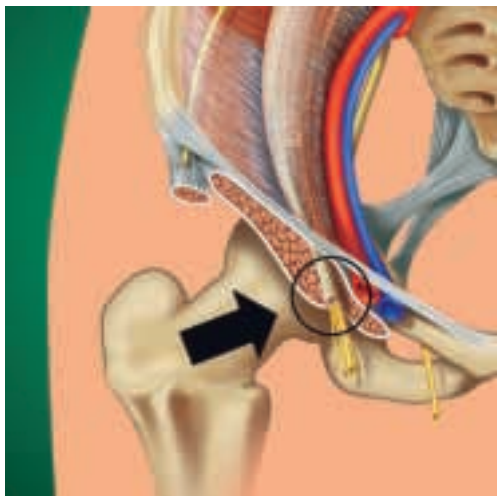
Impulse amplitude:	0–5.0 mA constant current infinitely adjustable
Impulse frequency:	1 Hz and 2 Hz, switchable
Impulse width:	0.1 msec
Digital display:	3 digits from 0.2–4.99 mA 2 digits from 5.0 mA
Resolution:	0.01 mA
Output voltage:	32 Vpp max.
Battery:	9 volt, type 6LR-61 or 6F22
Electrode cable:	integrated
Battery check:	red LED

## Indications for Stimuplex® Dig RC/A

- ideal for plexus blockades of the upper and lower limbs
- especially suitable for plexus blockades of the lower limbs (e.g. 3 in 1 block)
- nerve plexus blockades for patients who are not able to communicate and cooperate (e.g. sedated patients and patients under general anaesthesia)



The use of the Stimuplex® system for an inguinal paravascular block of the lumbar plexus (3 in 1 block)



## Stimuplex® A needles

With special short bevel:

- extremely smooth gliding through all tissue layers
- easily identifies the perivascular space by a distinct "click"
- reduces the risk of nerve damage

Stimuplex® A needles with fully insulated needle shaft are available in 6 lengths with appropriate diameters



Ergonomic needle hub:

- allows precise needle guidance during puncture

## Two options to adjust the stimulation current

Via Remote Control RC

- special socket to connect the new Remote Control RC

or normal control knob

- stimulation can also be done via the control knob

Logarithmic current regulation

- precise current adjustment especially in the low range around 0.2 mA



Practice-proven lengths of electric cable and injection tube:

- provide the necessary distance to the unsterile area
- allows for aspiration and injection using the "immobile needle" technique

Please note:

Stimuplex® Dig RC nerve stimulator is also compatible with Stimuplex® D needles (see page 6/7)



Stimuplex®-Feed back for high safety and success rates.



# Stimuplex® HNS 11 Stimuplex® D

"Single-shot" technique with new first-class technology

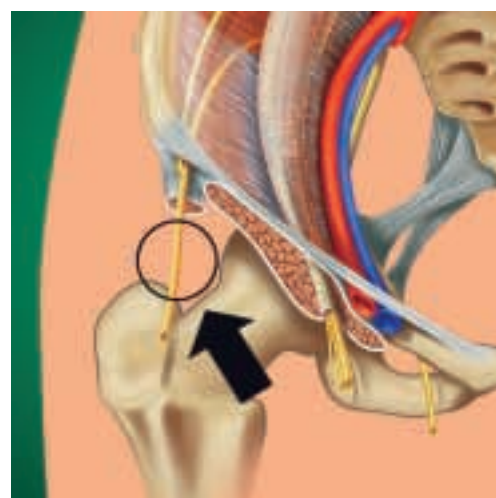
The new nerve stimulator Stimuplex® HNS 11 in combination with Stimuplex® D, the latest generation of stimulation needles, provides high level safety and success rates.

Selectable stimulus duration offers either to selectively stimulate motor fibres of mixed nerves or to stimulate sensory fibres for locating pure sensory nerves. Precise measurement of the delivered stimulus current allows a very accurate positioning of the needle tip close to the nerve.

The new Stimuplex® D needle with special coating features a non-cutting atraumatic bevel. The pin-point electrode supports optimal nerve localization.

## Indications for Stimuplex® HNS 11/D

- localization of practically all mixed nerves for plexus and peripheral nerve blocks by selective stimulation of motor fibres without causing unpleasant sensations.
- in addition, pure sensory nerves (e. g. lateral femoris cutaneous nerve) can be located using a longer pulse duration to stimulate sensory fibres. This is useful for nerve blocks, e. g. in pain treatment.



The use of Stimuplex system for the blockade of the lateral femoris cutaneous nerve by using pulse duration 1.0 ms

## Stimuplex® HNS 11 nerve stimulator

Switchable linear current ranges:

- high resolution fine adjustment of stimulus amplitudes
- especially suitable for technically sophisticated needles with pin-point electrodes
- current ranges 0-1 mA and 0-5 mA

Selectable pulse duration:

- selective stimulation of motor fibres (0.1 ms)
- additional stimulation of afferent fibres (1.0 ms)
- Acoustical and optical stimulus indication
- excellent control and feedback of the stimulator functions

Various alarm functions

- avoid failure of the procedure in case of e. g. bad electric circuit, low battery, etc.



Advantages from the latest digital technology

Two different display modes

- preset current (mA/current set mode), read actual current (mA/current read mode)

Impedance check

- check of electric circuit by comparing present and actual current values

High accuracy stimulation

- direct, high precision measurement of current
- precise rectangular pulse shape

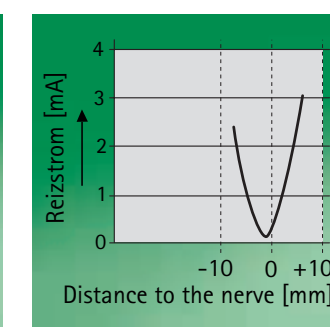
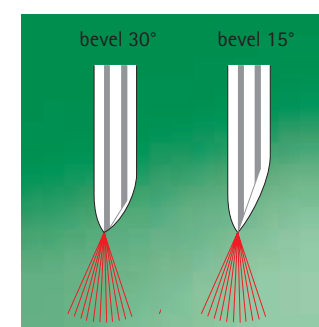
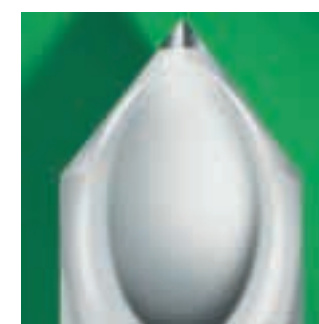
For further details please refer to the user manual/instructions for use

The high end in nerve stimulation

## Stimuplex® D needle

The ideal pin point electrode

- concentrates the entire stimulus current at the very needle tip
- supports precise nerve localization at lowest threshold currents



Extremely narrow threshold curves provides

- excellent estimation of the distance between the needle tip and the nerve
- most accurate needle positioning using lowest threshold currents

## Special needle coating

- homogeneous and smooth surface from hub to tip
- smooth puncture with excellent tactile feedback
- complete coating of the needle results in an atraumatic tip

## Wide range of different types and sizes

- covers practically all indications in plexus anaesthesia
- choice of 15° or 30° bevel according to your personal preference of puncture force and gliding characteristics



## Optional steam sterilizable control knob

- convenient sterile operation of all functions
- assisting staff is not necessary

Stimuplex® HNS 11 and Stimuplex® D complement the well known and proven Stimuplex range with latest high-end technology. Full compatibility guaranteed.

Stimuplex®  
Feed back for high safety and success rates.

### Technical Data:

Instrument type:	BF
Battery:	9 V
Power consumption:	3.3 mA
Stimulation current:	max. 5 mA / 0 Ω - 12 kΩ
Stimulation voltage:	max. 65 Vpp
Stimulation frequency:	1 Hz / 2 Hz
Measuring tolerance:	Adjustment control display = 3% (set point) Flowing current display = 2% (actual value) based on set mA values (5 mA or 1 mA)

Please note:  
Stimuplex® HNS 11 nerve stimulator is also compatible with Stimuplex® A needles (see page 4/5)



# Contiplex® D / A

## Alphaplex®

NEW

Sets for continuous plexus blockades with and without nerve stimulation.

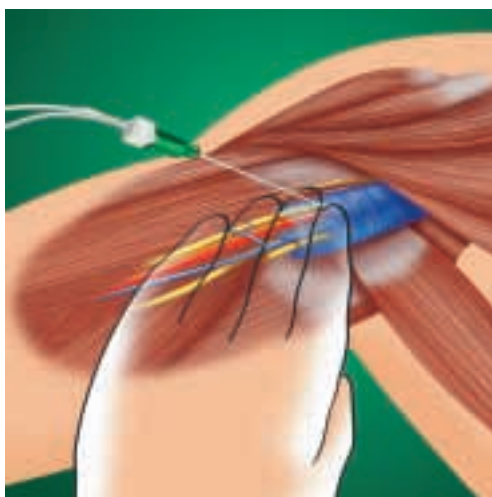
The Contiplex® and Alphaplex® sets are offering special catheters and a modified 18G I.V. cannula with differently bevelled insulated needles according to your choice.

*Contiplex® D and A sets are available as catheter sets or as a single sterile cannulae.*

The Contiplex® D consists of the well-proven Stimuplex® needle with all the advantages mentioned before. These devices can be connected to a Stimuplex® nerve stimulator (HNS 11 or Dig RC) in order to gain the ideal position of the needle tip avoiding mechanical paraesthesia.

The Contiplex® catheter which is made of the same polyamide material as the well-known Perifix® catheter provides all the advantages of a continuous technique.

Special emphasis was laid on the tip forming process to create a smooth and atraumatic tip for the new Alphaplex® catheter.



### Contiplex® catheter

The atraumatic tip design:

- easy and atraumatic insertion as with the well-tried and proven Perifix® epidural catheter

Approved polyamide material:

- for prolonged implantation

### Contiplex® D cannulae

Attached to both Contiplex® D and Alphaplex® sets:

- Stimuplex® D needle design
- simultaneous stimulation and aspiration/injection
- available with 15° and 30° bevel to chose preferred puncture characteristics

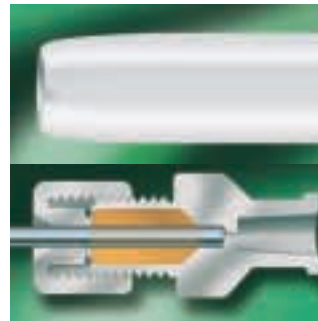
Ideal for plexus blockade of the upper limbs.



*Alphaplex® sets with Seldinger wire and Contiplex® D cannulae are available in 4 different versions (see page 11).*

Seldinger guide-wire with highly flexible tip

- atraumatic wire placement and safe catheter insertion



New catheter tip design

- smooth and atraumatic tip design

Safe connection

- kinking prevention due to the well-proven Perifix® catheter connector

## Indications for Contiplex® and Alphaplex®

- long duration anaesthesia for prolonged operations on upper limb
- postoperative analgesia for as long as required
- prolonged treatment for painful conditions such as reflex sympathetic dystrophy or cancer pain
- a differential nerve block when required
- optimal blood flow following replantations
- excellent anaesthesia for hand operations and fractures of the radius
- active physiotherapy without pain



*Alphaplex® catheter sets acc. to the Seldinger technique: Insertion of the catheter via the Seldinger wire*



*Contiplex® D catheter sets acc. to the Braunula technique: The threading assist guide allows easy insertion of the plexus catheter through the 18G I.V. catheter*



Contiplex® and Alphaplex®

A real contribution to plexus blockade. Take your choice.



# Product Identification

The complete equipment  
on one glance

Product Type	Product Description	Canula (O. D. × Length)	Code Number	Sales Unit
Nerve Stimulators	Stimuplex® HNS 11, with electrode cable for Stimuplex® D-, Stimuplex® A- and Contiplex® D-needles		0489 2097	1
	 Stimuplex® DIG RC, with integrated electrode cable for Stimuplex® D-, Stimuplex® A- and Contiplex® D-needles		489 1996 B	1
Needles, cannulae and sets for peripheral nerve stimulation	Stimuplex® D, needles with 15° bevel			
	D 25/035, 25 G × 1 <sup>1</sup> / <sub>3</sub> "	0.5 × 35 mm	0489 4103	25
	D 25/055, 25 G × 2 <sup>1</sup> / <sub>8</sub> "	0.5 × 55 mm	0489 4111	25
	D 26/040, 23 G × 1 <sup>1</sup> / <sub>2</sub> "	0.6 × 40 mm	0489 4120	25
	D 26/070, 23 G × 2 <sup>3</sup> / <sub>4</sub> "	0.6 × 70 mm	0489 4138	25
	D 27/050, 22 G × 2"	0.7 × 50 mm	0489 4146	25
	D 27/080, 22 G × 3 <sup>1</sup> / <sub>8</sub> "	0.7 × 80 mm	0489 4154	25
	D 27/120, 22 G × 4 <sup>3</sup> / <sub>4</sub> "	0.7 × 120 mm	0489 4162	25
	D 29/150, 20 G × 6"	0.9 × 150 mm	0489 4170	25
	Stimuplex® D, needles with 30° bevel			
	D 17/040, 22 G × 1 <sup>1</sup> / <sub>2</sub> "	0.7 × 40 mm	0489 4189	25
	D 17/050, 22 G × 2"	0.7 × 50 mm	0489 4197	25
	D 17/080, 22 G × 3 <sup>1</sup> / <sub>8</sub> "	0.7 × 80 mm	0489 4200	25
	Contiplex® D, cannula with 15° bevel			
	D 28/055/C, 18 G × 2 <sup>1</sup> / <sub>8</sub> "	1.3 × 55 mm	0489 4219	25
	D 28/110/C, 18 G × 4 <sup>3</sup> / <sub>8</sub> "	1.3 × 110 mm	0489 4294	25
	Contiplex® D, cannula with 30° bevel			
	D 18/055/C, 18 G × 2 <sup>1</sup> / <sub>8</sub> "	1.3 × 55 mm	0489 4227	25
	Contiplex® D, Sets			
	with Contiplex Catheter 0.45 × 0.85 × 400 mm			
	with cannula D 28/055/C, 18 G × 2 <sup>1</sup> / <sub>8</sub> ", 15° bevel	1.3 × 55 mm	0489 4235	10
	with cannula D 18/055/C, 18 G × 2 <sup>1</sup> / <sub>8</sub> ", 30° bevel	1.3 × 55 mm	0489 4243	10
	 with Contiplex catheter 0.45 × 0.85 × 1000 mm	1.3 × 110 mm	0489 4391	10
	with cannula D 28/110/C, 18 G × 4 <sup>3</sup> / <sub>8</sub> ", 15° bevel			



Product Type	Product Description	Canula (O. D. × Length)	Code Number	Sales Unit
Needles, cannulae and sets for peripheral nerve stimulation	Stimuplex® A, needles with 30° bevel			
	A 25, 24 G × 1"	0.55 × 25 mm	0489 4251	25
	A 25, 22 G × 1"	0.70 × 25 mm	0489 4539	25
	A 50, 22 G × 2"	0.70 × 50 mm	0489 4502	25
	A 50, 21 G × 2"	0.80 × 50 mm	0489 4375	25
	A 100, 21 G × 4"	0.80 × 100 mm	0489 4260	25
	A 150, 20 G × 6"	0.90 × 150 mm	0489 4278	25
	Contiplex® A, cannulae with 30° bevel			
	18 G × 1 <sup>3</sup> / <sub>4</sub> "	1.3 × 45 mm	0489 3611	25
	18 G × 2 <sup>1</sup> / <sub>8</sub> "	1.3 × 55 mm	0489 3643	25
	Contiplex® A, Set with Contiplex Catheter 0.45 × 0.85 × 400 mm			
	with cannula 18 G × 1 <sup>3</sup> / <sub>4</sub> "	1.3 × 45 mm	0489 3603	10
	with cannula 18 G × 2 <sup>1</sup> / <sub>8</sub> "	1.3 × 55 mm	0489 3638	10
	<b>NEW</b> Alphaplex® Sets with catheter 0.9 × 1.25 × 330 mm, guide wire and Contiplex® D / D 28/055/C; 15° and 30° bevel			
	Basic Set, 15° bevel	1.3 × 55 mm	U 180 0210	10
	Super Set, 15° bevel	1.3 × 55 mm	U 180 0200	10
	Basic Set, 30° bevel	1.3 × 55 mm	U 180 0201	10
	Super Set, 30° bevel	1.3 × 55 mm	U 180 0203	10
Set for "Immobile Needle" technique acc. to Winnie	Plexufix®, needle with 45° short bevel and extension tubing 0.75 × 1.85 × 300 mm			
	24 G × 1"	0.55 × 25 mm	0489 1520	100
	24 G × 2"	0.55 × 50 mm	0489 1562	100
	Extension tubing for Plexufix®			
	0.75 × 1.85 × 230 mm		0489 1511	100
Accessories for plexus anaesthesia	① <b>Electrode cable for Stimuplex® HNS 11</b> for Stimuplex® A-, D- and Contiplex® D-needles, length 125 cm		0489 2070	1
	<b>NEW</b> ② <b>Electrode cable for Stimuplex® Dig RC</b> for Stimuplex® A-, D- and Contiplex® D-needles, length 150 cm		489 2917 B	1
	<b>Remote Control</b> for sterile one-hand-operation (especially for Stimuplex® DIG RC)		489 2216 B	1
	<b>Fingerrings</b> (especially for Stimuplex® DIG RC)		489 2224 B	1
	<b>Knob for sterile handling</b> (especially for Stimuplex® HNS 11)		0489 2089	5
	<b>Adaptor cable</b> for Contiplex® A needle and electrode cable type ① or ② – Length 75 cm, autoclavable (up to 130° = 234°F)		0489 2925	1
	<b>Adaptor cable</b> for needles other than B. Braun to fit ① or ② – suitable for almost all stimulation needles autoclavable (up to 130° = 234°F)		0489 2941	1

# B. Braun Regional Anaesthesia Equipment

Get the complete range

Spinal Anaesthesia	
Spinocan®	Needle for spinal anaesthesia, Quincke bevel
Atraucan®	Special needle for spinal anaesthesia Paediatric sizes
Pencan	Special needle with pencil point bevel Paediatric sizes
Spinocath®	Set for continuous spinal anaesthesia and pain treatment (CSA)
Combined Spinal/Epidural Anaesthesia (CSE)	
Espocan®	Set for spinal-epidural anaesthesia
Epidural Anaesthesia	
Perifix®/Perifix® Soft	Continuous epidural and caudal anaesthesia trays: <ul style="list-style-type: none"> <li>– complete sets</li> <li>– sets with Loss of Resistance Device (L.O.R.)*</li> <li>– filter sets</li> <li>– mini sets</li> <li>– catheter, screw connector, L.O.R.* device</li> </ul>
Perifix® EF	Epidural flat filter
Perican®	Needle with Tuohy bevel
Perifix® L.O.R.*	Low friction device for the L.O.R.* technique
Perifix® Paed/ Perican® Paed	Paediatric epidural sets and needles

\*This low friction device has limited aspiration capabilities for use with fluids. Perifix® L.O.R. should not be used for injections of drugs.

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